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AUTHOR Marion, Rodger
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ABSTRACT

A method for planning educational program development was developed which draws all elements of the planning, design, execution, and evaluation of a program into one systematic unit. The approach uses successive models of what, how, and where people learn to provide strategies for the design of instructional sequencies. The first step is a model of the structural organization of the behavioral outcomes which is a hierarchical illustration of how the behavior outcomes fit into an organized system of knowledge and skills. The second step is a model of the specific human mechanisms for learning, motivation, and attention that are utilized in the acquisition of the desired instructional outcomes. The third step is a model of the environmental structure necessary to facilitate the desired learning. The model was used on the Kentucky January Project which taught students about health care delivery systems and the teamwork approach to health care. (Auhtor/JY)

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AN APPROACH TO INSTRUCTIONAL DESIGN USING SUCCESSIVE MODELS

BY

RODGER MARION

REPORTING THE WORK OF:

TOM CONNELLY, JR.
DANIEL A. CLARK
RODGER MARION
TERRY WALSH

OFFICE OF SPECIAL PROGRAMS
COLLEGE OF ALLIED HEALTH PROFESSIONS
UNIVERSITY OF KENTUCKY

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AN APPROACH TO INSTRUCTIONAL DESIGN USING SUCCESSIVE MODELS

Rodger Marion

Abstract

The purpose of this paper is to describe a method for planning educational program development. This method draws all elements of the planning, design, execution, and evaluation of a program into one systematic unit. Through the use of this method the development of an educational program can be done in systematic stages.

This approach uses successive models of What, How and Where people learn to provide strategies for the design of instructional sequences. The first step is a model of the structural organization of the behavioral outcomes (objectives). This is a hierarchial illustration of how the behavioral outcomes fit into an organized system of knowledge and skills. The second step is a model of the specific human mechanisms for learning, motivation, and attention that are utilized in the acquisition of the desired instructional outcomes. The third step is a model of the environmental structure (classroom organization, meeting dates, etc.) necessary to facilitate the desired learning.

By using the models all the elements of the program are visualized and this makes planning easier. Also, by developing objectives from the models for all three areas it is easier to plan comprehensvie program activities and the evaluation design can be developed to cover all aspects of the program.

AN APPROACH TO INSTRUCTIONAL DESIGN USING SUCCESSIVE MODELS *

The purpose of this paper is to describe a method for planning educational program development. This method draws all elements of the planning, design, execution, and evaluation of a program into one systematic unit. Through the use of this method the development of an educational program can be done in systematic stages.

This is not a totally new approach to program planning and instructional design, but with the addition of certain elements into the traditional process, several benefits can be realized. All instructional programs have three areas of concern. The first is the content to be taught. The second is the process for learning or the teaching strategies that are used to teach the content. And, the third is the logistical elements of teaching. This includes such considerations as class size, meeting schedule, and classroom arrangement. The approach discussed here suggests that three models be developed from the program goals as the first stage in instructional design. These three models describe the three areas of concern discussed above. From these models are developed the specific objectives for learning, process and logistics. From the objectives the program is planned. Finally, from the objectives the evaluation strategies are developed.

By using the models all the elements of the program are visualized and this makes planning easier. Also, by developing objectives from the models for all three areas it is easier to plan comprehensive program activities and the evaluation design can be developed to cover all aspects of the program.

This paper is divided into two parts. The first part explains the approach to instructional design outlined above in detail. The second part illustrates how this approach was used to develop an existing, large scale program in Allied Health Professions education. This program is called Kentucky January. It is a very complex program and its development provides an excellent example of how instructional design using successive models can be done.

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* Paper presented at the annual convention of the Americal Educational Research Association, San Francisco, CA, April 21, 1976

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PHILOSOPHY OF SUCCESSIVE MODELS

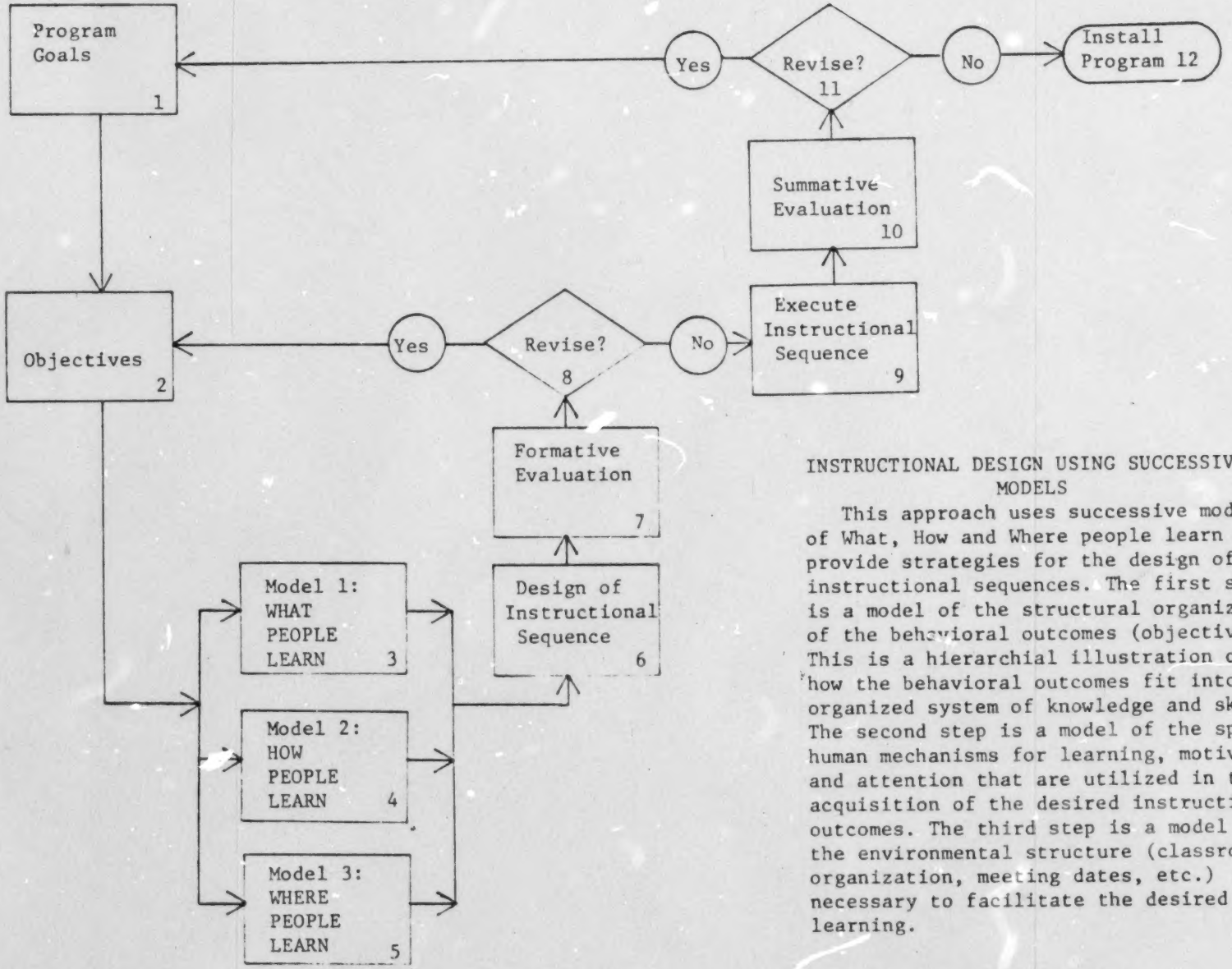
Program development and evaluation are highly related parts of the same process. Successful programs depend on careful development, and development depends on the feedback provided through evaluation. However, both development and evaluation depend on planning. Program planning is the key to program development and as such it must be undertaken in a systematic fashion.

Generally, program planning is a two step process: 1) the general program goals are defined, then 2) learning objectives are defined that breakdown the goals into specific desired outcomes or behavior. Here we wish to present an extension of the planning process that will be a help in program development, especially when the program is a complex one. This approach calls for the development of process models that define and give direction to the dynamic learning situation the program will generate. These models are a bridge between the program objectives and the actual design of the instructional sequence.

This approach uses successive models of What, How, and Where people learn to provide strategies for the design of instructional sequences. The first step is a model of the structural organization of the behavioral outcomes (objectives). This is a hierarchial illustration of how the behavioral outcomes fit into an organized system of knowledge and skills. The second step is a model of the specific human mechanisms for learning, motivation, and attention that are utilized in the acquisition of the desired instructional outcomes. The third step is a model of the environmental structure (classroom organization, meeting dates, etc.) necessary to facilitate the desired learning. This model for instructional design and development is presented in Figure 1. In this figure we can see how the planning stage (goals, objectives, process models) leads to the design stage, and finally how evaluation provides feedback into the development process.

This approach provides for a complete modeling of the whole program development process. The three process models provide a framework whereby all the components of a program can be hung. In Figure 2 this framework is presented.

The model of what people learn leads to the learning objectives which leads to the teaching strategies. These in turn lead to the evaluation strategies for what is learned.



INSTRUCTIONAL DESIGN USING SUCCESSIVE MODELS

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FIGURE 1

MODEL OF INSTRUCTIONAL DESIGN AND DEVELOPMENT USING SUCCESSIVE PROCESS MODELS OF WHAT, HOW, AND WHERE PEOPLE LEARN

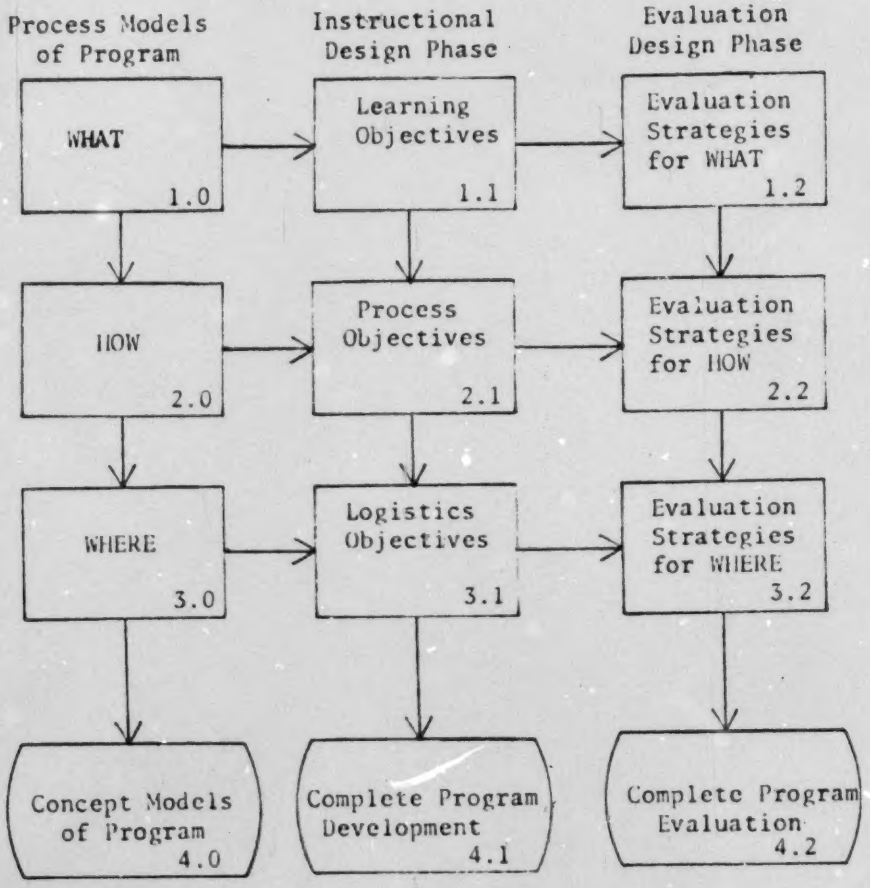


FIGURE 2

FLOW DIAGRAM FOR USING PROCESS MODELS FOR INSTRUCTIONAL DESIGN AND EVALUATION DEVELOPMENT

The model of how people learn leads to process objectives that effect the development of the teaching strategies. The most effective teaching strategy is one that makes the best use of the human dynamics that are generated by the program (For example, in a small group situation an interactive strategy - a game or a project - is more effective than individual reading assignments). The model of how people learn helps the instructional developer to capitalize on the dynamic elements inherent in the program and thus to increase the probability of effective learning. Finally this leads to evaluation strategies that determine the effectiveness of the learning environment provided by the program activities.

The model of where people learn is the final piece in the total program model. From this model comes the logistics of the program. And finally, evaluation strategies to gather feedback on the program operation are developed.

Evaluation takes on two distinct forms; Formative and Summative. Strictly speaking the Formative form is used to improve the actual teaching sequence. Here the effects of the teaching program are compared to the learning objectives, and deficiencies in the teaching sequence lead to revision of the objectives, models and/or instructional strategies. The Summative form is used to decide if the program goals are being reached. If deficiencies are found here, revision of the entire process from goals to teaching sequence is considered.

In theory the Formative form is used first on portions of the program and the Summative form is applied last to the whole program. In practice both forms of evaluation are used at the same time. This loss of distinction is not important so long as the relative uses of each type of evaluation are not abused.

PLANNING MODELS FOR KENTUCKY JANUARY

The Kentucky January Project has sent allied Health students into the field during the month of January since 1973. From 1973 to 1975 almost 400 students have participated in the program. This year (1976) about 180 students from the Allied Health professions, Nursing, Education, and Social Work have participated.

The overall purpose of Kentucky January is to teach students about the Health Care Delivery system and to show them the benefits of a teamwork approach to health care. This purpose is accomplished by a combination of on-campus and in-field learning experiences. The on-campus phase occurs during the Fall semester and is mainly an orientation and preparation period. The major phase of the program occurs in the field. The "field" is 25 sites scattered throughout the state of Kentucky. Student groups of 7 to 9 people plus a

faculty sponsor are sent to each site to spend the month of January studying the health care system (actually they go into the field on January 7th, return home each weekend, and the field experience is over January 23rd).

Some sites are rural and some are urban. All sites have a hospital, physician and dentist offices, health department, nursing home and a home health agency. The "base" for the team is the hospital and a hospital staff member is appointed as Location Coordinator to help the team in their tasks.

There are two types of teams: Observational and Clinical (Twenty sites are observational and five are clinical). An Observational team observes and studies the health care environment and the application of team to health care. A Clinical team also studies the health care environment, but their experience comes from actually delivering health care as a team and by working within the system rather than by observing it.*

The program development undertaken for the Kentucky January project did not follow the ideal that was presented in the section above. Since the Kentucky January project had been done three times prior to the beginning of the formal development process in September 1975, program goals and teaching sequence were already in existence. Thus, we worked backwards from the existing teaching program to the program goals, and then went forward to develop learning objectives, the process models, and a revised teaching program.

The program goals for Kentucky January are presented below:

1. Provide the students an experience that will allow them to define the team concept, apply the concept, and identify the potential of teamwork in the practicing environment.

* For a detailed overview of the Kentucky January project see Program Description and Evaluation Summary, (1975), or the Study Guide and Resource Manual (pp. 2-13, 1975).

2. To understand the concept of the Health Care Environment, its sub-environments, and its relation to the World Health Organization's definition of Health. Recognize potential areas for improvement and areas to effect improvement in the Health Care System and the Health Care Environment.

From these two program goals, sub-goals and learning objectives were developed. The objectives were developed by the Kentucky January staff and reviewed by members of the faculty of the College of Allied Health Professions, College of Social Professions, and College of Nursing.

The three process models of What, How, and Where were developed to assist the program developers in visualizing the program. The complex learning process, the group/team organization used for the students, and the combination of classroom, small group and in-field elements of the learning environment make for a program that is hard to visualize and difficult for which to plan. The models reduce some of this complexity.

The learning process model (What is learned) is presented in Figure 3. This model illustrates the sequence in which the sub-goals and learning objectives are learned.

The model of internal human organization (How people learn) is presented in Figure 4. This model illustrates the small group nature of the Kentucky January program. The students and their faculty sponsor form an interdependent group that is placed in an unfamiliar environment (the in-field assignment to a Kentucky town and the health care and community agencies found there). The students and faculty sponsor depend on each other for direction and support. Thus this group becomes a powerful force on each individual and each individual will in turn work for the goals set by the group. All of the teaching strategies are aimed to enhance and utilize this interdependence to achieve the program goals.

The model of the environmental organization (where people learn) is presented in Figure 5. This model indicates, against a time line, the various activities and meetings that make up the program. The type of meeting (faculty, program wide, small group, Orientation or field meeting) influences the instructional strategies used. Also, some of the activities (location coordinator conference, pre-field site visit) are strategies in themselves. The bulk of the program is done through the field site visits and field meetings, and the teaching program is aimed primarily towards these areas. However, the earlier meetings and activities are important as they supply preliminary information needed for the field experience.

There are some goals relative to the faculty sponsor. It may be noted that there are faculty meetings listed in Figure 5. It is expected that new faculty will learn about teamwork and the

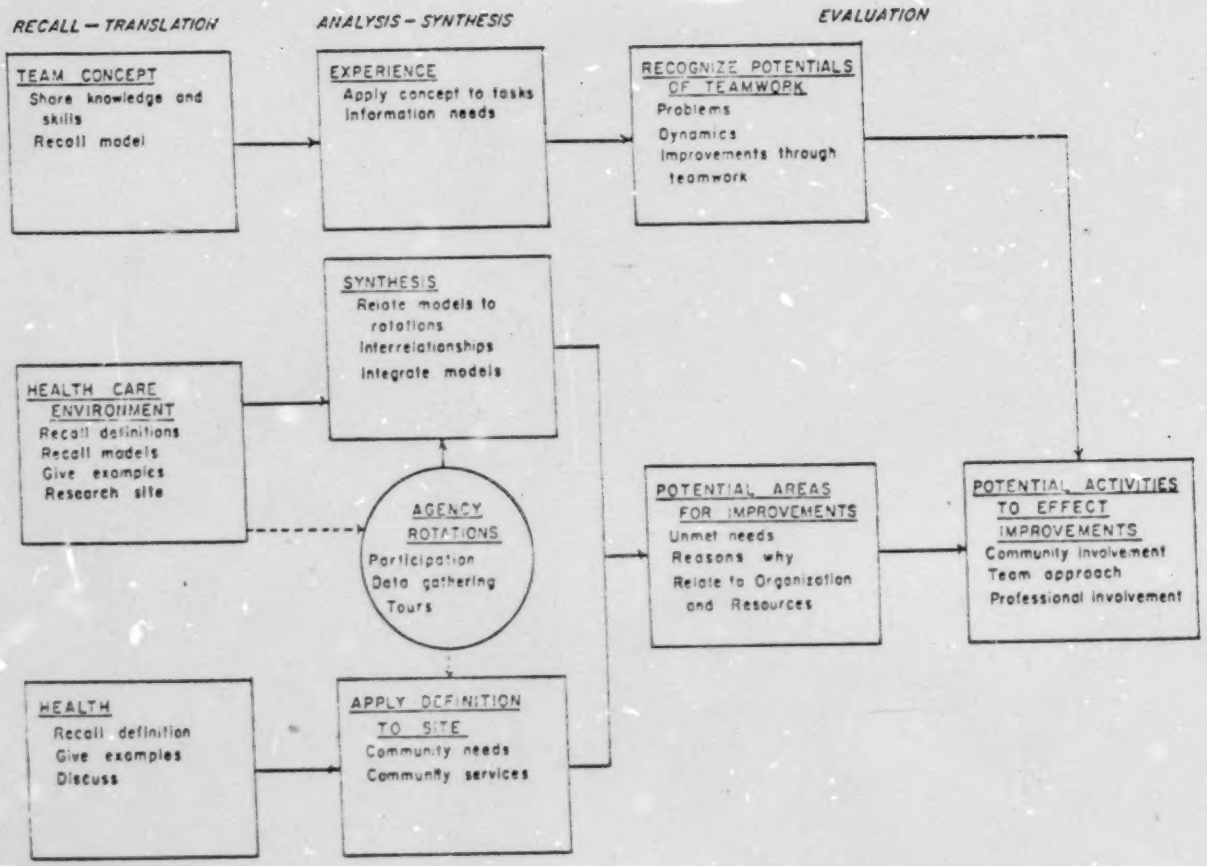
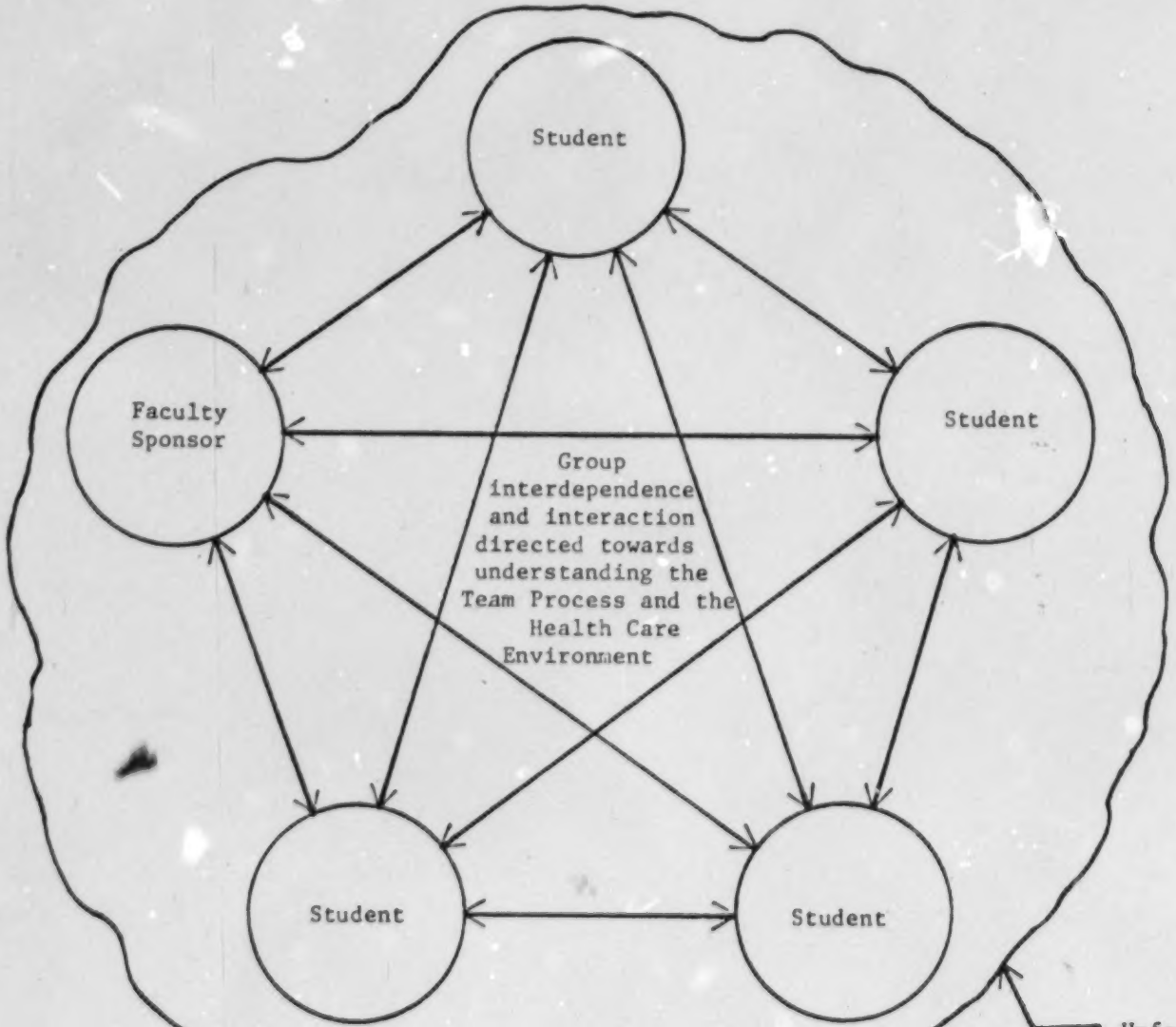


FIGURE 3

MODEL OF SYSTEM OF KNOWLEDGE/LEARNING PROCESS (WHAT) FOR KENTUCKY JANUARY PROGRAM


Student
Faculty Sponsor
Student
Group interdependence and interaction directed towards understanding the Team Process and the Health Care Environment
Student
Student

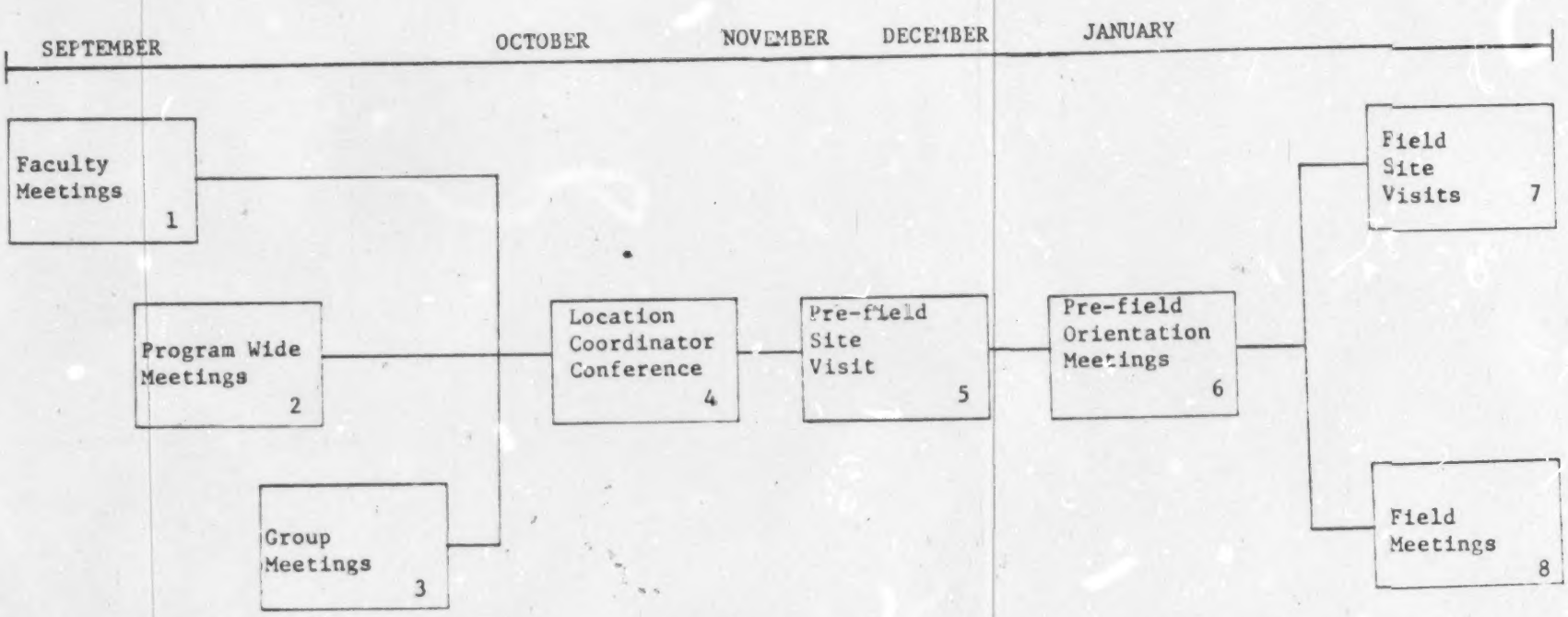


FIGURE 5

MODEL OF EXTERNAL ENVIRONMENTAL ORGANIZATION (WHERE) FOR KENTUCKY JANUARY PROGRAM

health care system as well as students. Old as well as new faculty also profit from the opportunity to get out of the university setting and into the field.

The teaching program (made up of the Translator Document and the Teaching Aids) was developed from the objectives and these models. Copies of the teaching materials are contained in the Faculty Sponsor Manual.

EVALUATION DESIGN AND GOALS

From the models presented above, were drawn evaluation goals. From the learning process model (What is learned) came a series of evaluation goals that parallel the goals and sub-goals of the program itself. In general these evaluation goals ask "did the students learn what was expected?" From the model of how people learn came several goals that generally ask " did the group development process occur and did it lead to effective learning"? Finally, from the model of where people learn came evaluation goals aimed towards attendance at meetings, suitability of meetings, logistics of the site visits, and suitability of accommodations, meals, and transportation.

Learning Process Strategies

The evaluation goals drawn from the learning process model of the Kentucky January program parallel the learning goals. The relationship between the learning goals and specific evaluation strategies are summarized in Table 1. The strategies basically fall into two categories: 1) objective measurement instruments and 2) a subjective report.

The objective measurement instruments are 1) Recall Test 2) Health Care Environment Test, and 3) Health Professions Attitude Survey. These three instruments are administered on a pre-post-test basis and are used to measure change in knowledge (at the Recall and Analysis levels) and attitudes made during the program.*

The subjective Team Final Report is written to a specific outline and is designed to evaluate the Analysis, Synthesis and Evaluation portions of the learning process model (see Figure 3). The reports will be content analyzed, using the outline, program goals and sub-goals as guides, by the program developers and the Allied Health faculty. The evaluation will be of a mastery nature,

*A monograph Evaluation Goals and Strategies For Kentucky January that describes the evaluation instruments in detail is available from the author.

TABLE I

EVALUATION GOALS AND STRATEGIES FOR LEARNING OUTCOMES

LEARNING SUBGOALS/EVALUATION GOALS	EVALUATION STRATEGY
TEAM	
1. Have a basic recall understanding of Kentucky January Team Concept.	Recall Test
2. Share professional knowledge and skills; breakdown stereotypes.	Health Professions attitude Survey, Team Final Report (parts I.A.& I.B)
3. Apply Team concept to tasks	Team Final Report (part I.C.)
4. Gain a basic knowledge of group dynamics	*
5. Recognize problems/issues involved in teamwork and possible solutions to problems.	Team Final Report (part I.C.)
6. Recognize potentials of teamwork and how teamwork/Kentucky January Team concept can be applied to improve the Health Care Environment.	Team Final Report (Parts I.D. & III.B.)
HEALTH CARE ENVIRONMENT	
1. Have a basic recall knowledge of the Health Care Environment.	Recall Test
2. Have a recall understanding of the WHO definition of Health.	Recall Test
3. Information gathering.	*
4. Synthesis of Rotational experience.	Health Care Environment Test Team Final Report (parts II.A. & II.B.)
5. Apply definition of Health & Site.	Team Final Report (part II.C.)
6. Recognize potential areas (unmet needs) for improvement.	Team Final Report (part II.C.)
7. Recognize potential areas to effect improvements in the Health Care Environment.	Team Final Report (parts III.A., III.C. & III.D.)

* Then goals are not directly evaluated, but successful completion of other goals will imply that these goals, which are prerequisites, were accomplished.

i.e., "does the report indicate that the students were able to accomplish the stated goals and sub-goals?" A checklist of what to look for will be used and a reconciliation process will be used to achieve consensus between the people analyzing the reports.

Group Development Strategies

The evaluation goals draw from the How People Learn model (Figure 4) are presented in Table 2. The strategies for these goals are two attitude scales, 1) Group Effectiveness Scale and 2) Climate Gauge; and the Team Final Report (Part I.C).

The Group Effectiveness Scale is administered 5 times and provides a measure of group development. The Climate Gauge is administered each day of the field program to a random sample of students. It provides a measure of student attitude towards the program, their group, their faculty sponsor and themselves.

The section of the Team Final Report that deals with group development will provide information regarding the issues and problems faced by teams and their success in coping with them.

Meetings, Logistics, and Usage of Teaching Tools

From the model of the external environment (Where people learn) come several evaluation goals related to meetings and program logistics. These goals and the strategies developed to measure them are presented in Table 3. Also, included here are goals for the evaluation of the efficiency and utilization of the Teaching Aids and the evaluation of the degree to which the suggested learning sequence was followed.

This information is gathered mainly through two forms 1) The Fall Activities Form which is administered prior to going into the field, and 2) The Open Ended form which is administered, in slightly different versions, after the field experience to students, Faculty Sponsors, and Location Coordinators.

The pre-administration of the Recall Test is done just prior to going into the field. Thus, it becomes a measure of the degree of mastery of the Recall-Translation phases of the Learning Process model. The Post-administration of this test provides a measure of additional learning in this area done during the field experience.

Individual Growth and Benefits from Program

Each student and Faculty sponsor have an individual and unique experience on Kentucky January. Thus each participant grows in his own special way and gains unique benefits from the program.

TABLE 2

EVALUATION GOALS AND STRATEGIES FOR GROUP DEVELOPMENT

EVALUATION GOAL	EVALUATION STRATEGY
1. Did the students and their Faculty Sponsor develop into a functioning group.	Group Effectiveness Scale
2. Was the attitude of the students during the program positive with regard to the program goals and their group.	Climate Gauge
3. What was the climate of cooperation, communication and interaction in the group with regard to team issues and problems of team functioning.	Team Final Report (part I.C)

TABLE 3

EVALUATION GOALS AND STRATEGIES FOR

ENVIRONMENTAL ORGANIZATION

EVALUATION GOAL	EVALUATION STRATEGY
1. What scheduled meetings/activities were attended?	Fall Activities Form
2. Were the Recall-Translation blocks of the learning process model taught/learned in the Fall?	Fall Activities Form, Pre Administration of the Recall Test.
3. During the Fall were plans made and research done for the in-field site visits?	Fall Activities Form
4. What teaching aids were used and how useful were they?	Teaching Aid Evaluation Checklist
5. Should any of the activities or proceedures be revised, deleted or replaced?	Open Ended Form - Student, (Parts I & II), Faculty (Parts I & II), Location Coordinator (parts I, II, & IV)
6. Should the Faculty Sponsor's function be revised?	Open Ended Form - Student (part III), Faculty (part III)
7. Should the arrangements for food, lodging, or transportation be revised.	Open Ended Form - Student (part IV), Faculty (part IV)
8. What did the Location Coordinator do that contributed to the program.	Location Coordinator (part III)

This information is not quantifiable, but it is of great value. It is expected that each participant will achieve the program goals, but it is also recognized that the effects of this program go beyond the program goals. Thus it is necessary to learn what are the broader, more personal effects of Kentucky January.

Three methods are used to gahter this information. First, in section V of the Open-Ended forms each person is asked to share what they gained as an individual. Second, the program staff spends time in the field talking with students, faculty, and people in the community to gain a "gut level" feeling for the impact of the program. Third, one student from each team is selected to represent their team on a panel discussion. The panel discussions are video taped and these tapes are kept on file at the University of Kentucky Medical Center. In these ways data is gathered regarding this highly subjective area. This information is used to give depth and reality to the more limited objective data.

DATA ANALYSIS PLAN

There are four distinct types of analysis that will be used: 1) gain, 2) tabulation, 3) growth and 4) content analysis. The type of analysis is determined by the nature of the evaluation goal measured by the instrument.

Change analysis (i.e., repeated measures analysis of variance, univariate and multivariate) will be used on the instruments that were administered on a pre-to-post basis. This includes the Recall Test, Health Care Environment Test and Health Professions Attitude Survey.

Tabulation of comments by frequencies will be done for the Fall Activities Form, Open-Ended Forms, and Teaching Aid Evaluation Checklist. Typical cross-tabulation variables will be sites, professions, clinical vs. observational teams, and rural vs. urban sites.

Growth analysis using stochastic modeling proceedures will be used for the Group Effectiveness Scale and the Climate Gauge. Markov Chains will be used for the Group Effectiveness Scale and simple state plotting will be used for the Climate Gauge.

Content analysis will be performed on the Team Final Reports. This will be done by using the objectives the reports were designed to evaluate and rating each report as to its coverage of the objectives.

CONCLUSION

In this paper has been discussed a philosophy of using process models to aid in the development of educational programs. An example of how this philosophy can be applied to an actual program in Health Professions Education has been given. Three kinds of models were dismissed; what people learn, how people learn, and where people learn. These three models are appropriate for any program, however they are not meant to exhaust the possible models that may be utilized.

The strength of this approach lies in the utility of the models to assist the program developer in visualizing the program. The models provide a bridge between the program goals and objectives and the teaching sequence. Also, they provide a framework upon which the objectives, teaching sequence and evaluation design can be logically arranged and related to each other.